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ABSTRACT

This overview of the home market for microcomputers and computer software presents a brief history of the development of the microcomputer and its use in the home. Factors which shape the home market are discussed, e.g., desire for improvement of educational skills, presence of children, previous experience with a computer, and decreasing prices. Statistics on the numbers and brands of computers purchased are presented for 1984, as well as projections for total home software sales through 1988. Evaluations of educational software packages for children are then presented; most reviews provide a brief description of the programs, the producer, cost, and computers on which the software will run. Titles of software include: (1) Master Type; (2) Snooper Troops; (3) Introduction to BASIC, Parts I and II; (4) Invitation to Programming, 1, 2 & 3; (5) Color Computer Learning Lab; (6) Teach Yourself BASIC; (7) Logo Implementations (Apple Logo, Atari's PILOT); (8) Facemaker; (9) Computer SAT; (10) Math Blaster; (11) Early Games; (12) Algebra Series; (13) Rocky's Boots; and (14) Academic Skill Builders in Math. Speculations on why educational home computing is generating so much interest conclude the paper. (JB)

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# Educational Software Best-Sellers in the Home Market

NIE Conference on Home Educational Computing
June 7-8, 1984, Washington, D.C.

Anne Wojcik

A conference on "Computers in the Home" signals just how rapidly the computer has captured the popular imagination. The number of computers in American homes has climbed from 220,000 at the end of 1981 to 6.4 million just two years later. Popular wisdom has it that it is interest in the educational applications of computers that is fueling this phenomenal growth. And while this is true to some extent, it certainly does not explain all the growth in this market. Market strategies aside, however, it is true that there is a large and expanding pool of homes where both computers and children can be found. That mix makes for some truly exciting potential. The adults in these homes express a great deal of interest in using the computer to help children develop and improve school skills. And these parents and children are buying an increasing number of software programs designed especially for home use, by a wide variety of software companies. If all the attention in the popular press, including articles on computers and children in Working Woman, Better Homes and Gardens, and Redbook didn't prove that the home education market is the "in" thing, then software profits in the millions may.

IR011999

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PERSPECTIVES ON THE HOME MARKET

Before turning to the discussion of the most popular computers and educational software for home use, let us first attempt a quick overview of the development of the home market. If this conference had been held in 1982, it would have coincided with the real birth of the home computer industry. By the end of 1982 there were 2.2 million personal computers in American homes. Just a year earlier the number of home machines was estimated at 220,000. Many of these early home machines were in the hands of hobbyists -- people who had been among the first to purchase computers and who, in general, enjoyed tinkering, either with the computer itself or with their self-developed software. The older machines in this installed base, the Apples, Radio Shacks and PETs, had been bought at prices well into the thousands of dollars. And even the early purchasers of Ataris and Texas Instruments had spent close to a $1000 for their systems.

But a new type of computer, and with it a new type of owner, had begun to appear. Computer manufacturers had discovered the home market, the 80 million American households that comprised a huge potential audience for their machines -- if the price could be made attractive enough and people convinced of the utility of the equipment. Both Atari and Commodore already had low-end machines on the market. The Atari 400 had been around for quite some time, and by June of 1982 was selling for $350. The VIC-20, a little over six months old, was down to $250 from its original price point of $299. Both these machines were identified in the

mind of the consumer with games -- computer games, mind you -- but games nevertheless. Texas Instruments, new to the home computer arena, continued to cut the price on its TI 99/4A machine. In December of 1981 the 99/4A was being sold at $450. By June 1982 it had dropped to $299. In September of that same year Texas Instruments instituted a $100 rebate, thereby making the move that began the real price wars in this market. That move resulted in the sales of millions of microcomputers, but ultimately drove Texas Instruments out of the home computer market.

And it was also Texas Instruments that first began to call to the mind of the general public the educational value of the home computer. Since that time, the public has seen some classic advertising capitalizing on this theme, including the much maligned Commodore commercial. Of course the TI machine, with more memory than the VIC and a real keyboard, unlike the 400, was a good machine with which to make the educational case. Commodore had also introduced a machine with true educational potential, the Commodore 64; a 64K machine with powerful graphics and sound capabilities, priced originally at $599, but which rapidly eroded to its current $149 level.

Thus by late 1982 there were a number of fairly powerful, affordable microcomputers on the market. Manufacturers, vying for the public's attention, were spending millions on ad campaigns. And one of the major functions these ads stressed was the educational value of a home computer.

**Figure 1.** What Computer Functions Interest Consumers Most?

| Function | Total | Own | Will Purch. |
|---|---|---|---|
| Taxes & financial affairs | 47% | 64% | 71% |
| Help children develop school skills | 45% | 79% | 77% |
| Programming | 43% | 68% | 75% |
| Air schedules, stock market information | 36% | 61% | 54% |
| Teach self or spouse | 34% | 43% | 50% |
| Order items, pay bills electronically | 33% | 55% | 56% |
| Type manuscripts | 30% | 40% | 54% |
| Send messages or electronic greetings | 30% | 57% | 44% |
| Play games with the family | 29% | 44% | 58% |
| Play arcade-style games | 24% | 43% | 48% |
| Keep children entertained | 24% | 38% | 52% |
| Bring material home from work | 22% | 43% | 46% |

## FACTORS SHAPING THE HOME MARKET

### Motivation

Retailers had always reported that when a family bought a personal computer for use at home, they cited educational uses as one of their prime motivators. And retailers and other industry analysts had long dismissed this as an attempt to justify the purchase of an expensive toy. But as prices dropped and inexpensive home computers offered enough power to do more than merely play games, the perception began to shift. Families still cite educational uses as a major motivator in home computer purchase and they are now being believed.

TALMIS' most recent data, from a study conducted in January of 1984 on a projectible sample of 1000 U.S. consumers, found that interest in the computer as a way to help children develop and improve skills taught at school was second only to interest in using the computer to help with taxes and financial affairs. Helping children with school skills was the function owners and potential owners were most interested in, as well as consumers under the age of 35. In addition, learning to program was of high interest. The information presented in Figure 1 supports the belief that interest in educational applications is a major factor in the decision to purchase a home computer.

### Presence of Children

The presence of children in a household is a very important variable related to both computer ownership and purchase intentions. TALMIS' data indicates that household with three or four members (one or two children) are substantially more likely to own a computer currently or be planning to buy one in 1984. While households of this size comprise 38% of U.S. households, 60% of the computers are owned by this group and 61% of the computers to be purchased in 1984 will be purchased by this group. This is strong evidence that the computer is a family tool and that the presence of children influences the purchase of a home computer.

Previous Experience with a Computer

One of the beliefs long held dear by the computer industry is that the computer a child uses in school will be the computer the family chooses to purchase for home use. All the evidence is not in at this point, but it would seem that a stronger influence on purchasing is previous computer use. One-fourth of all U.S. households have at least one member who uses a computer outside of the home. However, 68% of those households who currently own home computers have someone in their household who uses a computer outside of the home, compared to 27% of non-owners.

Of the 25% of U.S. households using a computer outside of the home, half (50%) are used at school and almost half (43%) are used at work. The brands used outside of the home most often by

adults are IBM (29%) and Apple (15%), while children are more apt to use Apple (47%) or Commodore (13%). This is not surprising, given IBM's domination of the workplace and Apple's strength in schools.

However, there is no evidence that brand use outside the home translates to the purchase of that brand for home use. Among those who intend to purchase a home computer during 1984, only those interested in Apples cite the fact that a child uses an Apple at school as a reason for buying. Among potential Apple buyers, use at school is the second most frequently mentioned reason for buying an Apple (19%), with quality/reputation (29%) the most frequently mentioned reason.

Price

Ultimately, it has been price cuts which have truly fueled the home market. Explosive sales growth only began when computer prices dropped below $300. While there certainly is an upscale component to the home market, it is sales of machines priced below $300 that both created and at present sustains this market.

There are also some demographic difference between low-end and high-end owners. The typical household that owns a low-end micro is headed by a male 35 years old or younger. Forty percent of the households have incomes in the $10,000 to $29,000 range. Sixty-six percent have one or more children. High-end owners, on the other hand, are over 35 years of age, 60% have incomes over

$40,000, and only 31% have one or more children in the household.

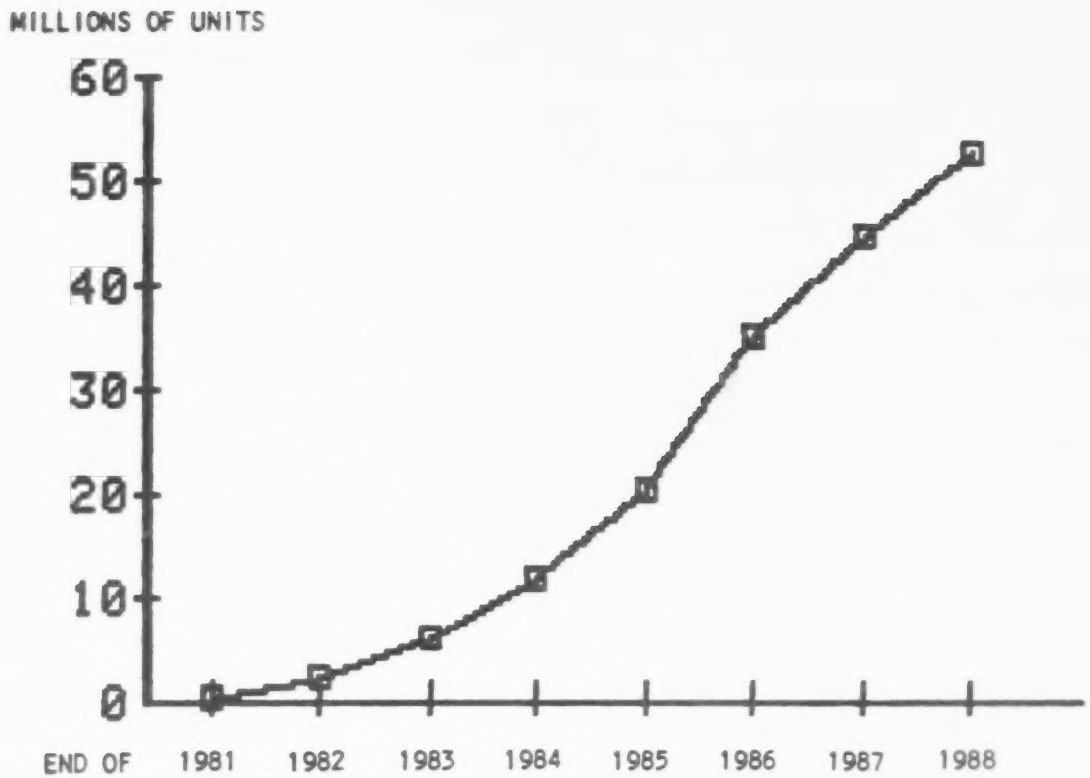
## THE HOME MARKET, 1984

### Hardware

As of January 1984, 7.5% of U.S. households owned a home computer, for an installed base of 6.4 million units. By the end of 1984, the saturation level could reach 15%, with sales of home computers during 1984 reaching 6 million units. TALMIS projects that by 1988 45% of American households will own computers, with a total of 53 million units installed, as can be seen in Figure 2.

What brands make up these 6.4 million units? Over one-quarter (28%) of the January installed base was accounted for by Texas Instruments 99/4A computers, the model that Texas Instruments discounted so aggressively. Though, by the fourth quarter of 1983, Texas Instruments had announced its withdrawal from the home market, the TI 99/4A, priced as low as $50 in many places, continued to sell. Apparently consumers could not pass up this bargain. Commodore tied with Texas Instruments for dominance in the home market, accounting for 28% of the market when the number of VICs and Commodore 64s were combined. Twelve percent of the machines installed were Timex models. Since January, Timex has also withdrawn from the home market. Atari and Radio Shack each held 10% of the installed base, followed by Apple at 9%. IBM,

**Figure 2. TALMIS Projections for the Home Computer Market: 1981-1988**




Installed Base 1981-1988



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Coleco and a variety of other models split the remaining 3%.

What peripherals are purchased with a computer? More and more the evidence points to computers being purchased with disk drives. Commodore estimates that 80% of its Commodore 64s are drive equipped, and Atari claims 66% of its installed base have at least one drive. The TV is the most popular viewing device. Though a number of families have purchased monitors, color televisions are used with the majority of home computers, especially the low-end models such as Atari, Commodore and Texas Instruments. After disk drives, the most common aftermarket purchase is a printer. As printer prices fall, it is expected printers will become fairly common as part of home systems. Modems are found with roughly 25% of the computers currently in homes.

What of the future? In an industry as volatile as the personal computer industry, crystal ball gazing is a perilous profession. However, given current price positioning, Commodore, Atari and Radio Shack can be expected to do well in the large low-end market, with Commodore the dominant home market machine. With a little shopping, a consumer can purchase a Commodore 64 and disk drive for $398. The 16K Atari 600XL with the special Atari cassette recorder costs $278. Atari drives are more expensive, so a drive equipped system is priced around $495. Radio Shack's 16K Color Computer costs $199.

Coleco has a unique niche with a total system priced at

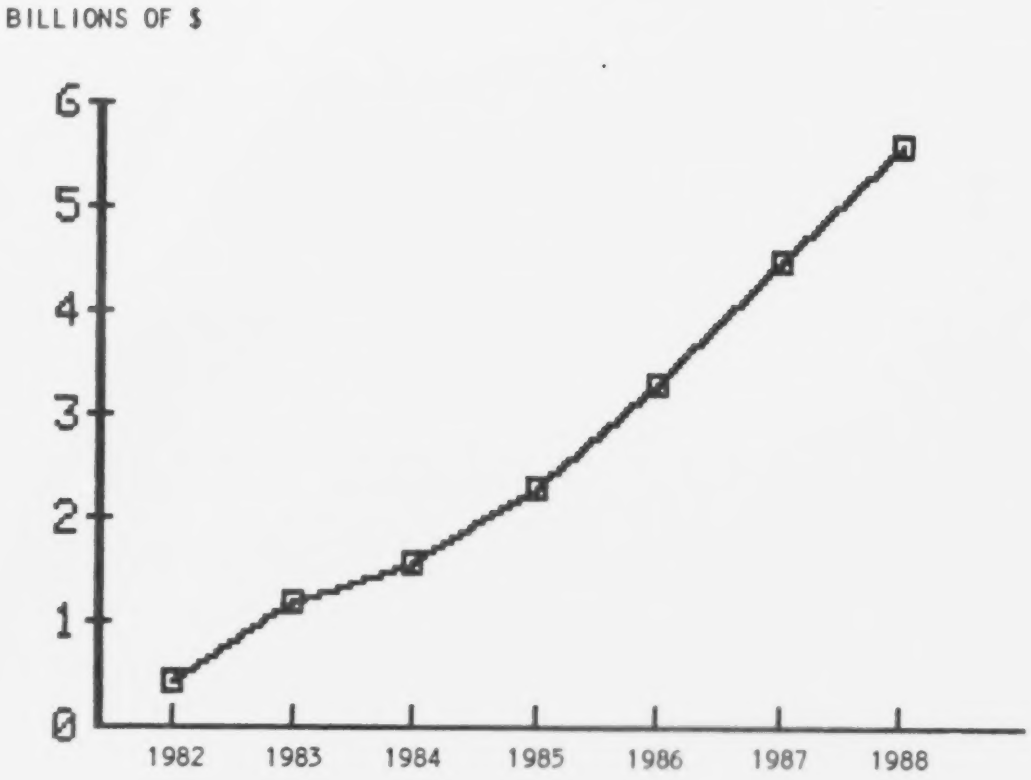
approximately $699. This price includes the 80K computer with Coleco's unique digital data tape system, a letter-quality printer and the word processing software that is embedded in the Adam computer.

At $699, Adam competes head-on with the cartridge-based IBM PCjr, though the jr doesn't include a printer or software. It does have the advantage of IBM's name, however. The two IBM PCjr models can be expected to increase IBM's share of the home market, though perhaps not as dramatically as most people originally predicted. The full PCjr system that most consumers are expected to be interested in is listed at $1295. This includes the 128K computer with IBM's infrared keyboard and one built-in disk drive. Jr sales have been below target, and the introduction of Apple's IIc (and resultant price drop on the IIe) will not help. Apple could be the big winner in the upper end of the home market. The 128K IIc is very competitively priced at $1295, and the IIe starter system (which includes the 64K computer, one drive and a monitor) listed at $995 might appeal to the economy-minded home buyer.

Software

Home market software sales for 1983 totaled $1.1 billion dollars. Figure 3 presents TALMIS' projections for total home software sales through 1988, at which time sales will have reached almost $6 billion. Home educational software for 1983 accounted for 9% of total sales or $94 million dollars. By 1988 educational

**Figure 3. TALMIS Projections for the Home Software Market: 1982-1988**



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purchases will account for 13% of overall sales.

Definitions become very fuzzy when one attempts to assign certain pieces of software to a particular market category. The TALMIS educational software sales figures include both traditional educational products (many of which also sell into the school market) and the newer products, designed specifically for home use, which use entertainment themes to motivate skill learning. Traditional self-improvement and reference materials aimed at both children and adults are also included in this category.

However, in the future TALMIS expects that software will be harder to categorize. As computers become more sophisticated and the way a user interacts with the machine becomes more and more simplified, software developers will be free to develop software that allows and encourages the use of the computer as an exploratory tool. While today software that teaches "How To Program in Basic" is popular and accounts for large dollar sales, in the future software will allow users to construct their own games and environments without really needing to write programs. We see precursors of this type of software in programs such as The Learning Company's Rocky's Boots and even in Electronic Arts' Pinball Construction Set. Thus in the future, TALMIS expects that a number of programs categorized as entertainment or even as arts and crafts software will have strong educational components.

For the present, however, the best way to get a picture of what

constitutes educational software is to look at what is currently selling. The market for home educational software really opened in late 1982, once there were a sufficient number of machines in place to justify developing products specifically for this segment. Late 1982 saw the debut of such companies as Spinnaker Software and the Learning Company. In addition, major school publishers began to venture into the home market and products from Xerox and Scott, Foresman, among others, began to appear. The attention the press afforded this software (and unprecedented ad campaigns on the part of several of the major players) began to focus the attention of the public on the educational value of computers. This coincided with the major push on the part of the hardware manufacturers to present the public with a good reason for buying a home computer, and home educational software was discovered.

TOP HOME EDUCATION PRODUCTS

The focus of this discussion will be on home educational software purchased for children. In some cases it is impossible to sort out for whom a particular program was actually purchased. This applies especially to typing programs and some of the introductory computer programming packages. It does eliminate from the discussion packages primarily aimed at adults, like the Cdex and American Training International packages offering instruction on the use of particular software packages and packages specifically introducing the consumer to the use of a particular personal computer.

Master Type

The most popular educational software package at present is also one of the oldest on the list, Master Type from Scarborough Systems, Inc. Master Type has been on the market over three years now and each month its sales seem to increase. Over 200,000 copies have been sold and it is currently in first place on at least three of the educational best-seller lists. It sells into both homes and schools. Priced at $39.95, the program runs on the Apple, Atari, Commodore 64, and IBM PC and PCjr.

Not only is Master Type a best-seller in its own right, it is also representative of a whole genre of best-selling programs -- touch typing instruction. While it is impossible to sort out whether these programs are bought for adults or children, all are usable with children. Other best-selling typing titles include Type Attack from Sirius, Typing Tutor II from Microsoft, and Typing Tutor & Word Invader from Academy. Since computers have basically typewriter-like keyboards, touch typing skills can considerably improve the ability to communicate with the machine. Thus the continuing popularity of these programs as the expanding pool of new computer users suddenly find themselves with a reason to learn to type.

Master Type is like an arcade game. The user assumes the role of planetary defender fighting off deadly invaders, depicted as letters or words appearing at the four corners of the screen.

The invaders fire missiles at the defender, who must destroy the missile by typing the words or letters displayed as quickly and accurately as possible. If the invading missile is destroyed it is replaced by a new word. The lesson continues until 40 words have been destroyed.

The program introduces each row of keys separately, presenting individual keys first, then short words, followed by longer words made up of letters from the row under study. Finally, the program presents words using letters from several rows. Students have control over both the speed with which letters/words are presented and the length of display of the entered word. Following each lesson, the user receives a report of the number of words typed per minute and a numeric score based on how many words were misspelled and how quickly the words were destroyed. The program comes complete with sound effects like those of the best arcade games, but does allow the sound to be turned off.

The Master Type package includes a manual that contains directions for running the game, descriptions of the options, and hints for winning. It also includes extensive directions for customizing lessons, a feature parents might wish to make use of as the child gains skill. The program is well-designed and most children will find it easy to use without adult help.

Snooper Troops

Snooper Troops I and II were among the first four programs

released by Spinnaker Software in the fall of 1982. Snooper Troops reached the best-seller charts in late 1982 and stayed there, except for brief interruptions, for 72 weeks. Sales have definitely slowed in the past few months, but combined the two Snooper Troops programs have sold in excess of 100,000 copies. Softsel has always listed the programs among its recreational (games) best-sellers. But Spinnaker introduced them as the first in a family of non-traditional educational games and that is the way most reviewers have viewed these two products. Priced at $44.95 each, the programs run on the Apple, Atari, Commodore 64, and IBM PC and PCjr. Spinnaker designates their age range as 10 to adult.

The two programs are similar in concept and function. In Volume II "The Case of the Disappearing Dolphin," Lily the dolphin has disappeared from the Tabasco Aquarium and there is a roster of eight likely suspects. As a Snooper Troop detective, the player has to solve the mystery and discover who was responsible for Lily's disappearance. To do this the player drives the SnoopMobile around town, using a wrist radio, flashlight and SnoopNet computer to pick up clues. Suspects can be questioned, houses searched and clues obtained from a mysterious Mr. X. Once the mystery has been pieced together, the player makes an accusation, but must also know why each of the other suspects is innocent. A correct accusation results in a full confession.

The structure of the program forces the player to track down all the clues before solving the mystery. Detectives must read

comprehensively and take careful notes, problem solving as they go and making use of all the tools at hand. The user learns to draw a street map, organize materials, classify information, and draw a conclusion from the information gathered. The program has a blend of high-resolution graphics, text, and interactions designed to keep players involved, but it takes long and careful investigation to get results. Younger children might find this frustrating and older children get impatient at the lack of more immediate feedback to their early conclusions. But since there is only one solution to the mystery, the demand for careful investigation increases the program's lifespan.

The program comes with a notebook which provides the circumstances surrounding the dolphin's disappearance and descriptions of each of the suspects. Space is provided for SnoopNotes. Not all the features of the program are self-evident (such as how to use the phone booth) and a few more pages of documentation could have been devoted to explaining such features. However, in the spirit of a good mystery, a case can be made for letting the player figure it out.

Programming Software

I have chosen to treat software that is an introduction to computer programming as a genre, rather than select individual best-sellers. If one rolled all the introductory programming packages together, they would probably by far outsell all the other educational programs. The hardware manufacturers have a

real edge here, since the evidence seems to indicate that programming software is often purchased at the same time that the home computer is bought. Thus the particular introductory programming package offered by the hardware manufacturer has a high probability of being selected. As noted above, it is impossible to tell for whom this software is bought and it should probably be considered a family educational purchase. Both owners and potential computer owners expressed a strong interest in learning how to program. How long this interest persists on the part of most owners is unknown. It seems likely that children in the 12 to 16 age group stay with programming longer than their parents do.

The best-selling title in this category belongs to Commodore, Introduction to BASIC, Parts I and II. Available for both the VIC-20 and the Commodore 64, this $19.95 program sells alongside the computer. Tutorial tapes combined with a workbook cover introductory aspects of BASIC programming, provide sample programs and test understanding. Atari has a similar series, Invitation to Programming 1, 2 & 3, each priced at $19.95. The series offers step-by-step lessons, workbooks and self-quizzes and is intended for age 10 to adult. The Radio Shack title is Color Computer Learning Lab. Retailing for $49.95, this program consists of eight tapes and a self-teaching manual covering all aspects of Standard Color BASIC programming. Texas Instruments' offering was called Teach Yourself BASIC. It sold for $29.95 and featured ten on-screen lessons beginning with simple commands and working up to color graphics and sound.

A wide variety of other programs teaching BASIC programming also sell into the home. Many of the more popular offerings are packaged as a book/disk combination.

LOGO

Logo has long been of interest to the school community. In some school systems it is the programming language of choice for children below the sixth grade level. Logo was developed in the late 1960s by Seymour Papert and implemented and improved by Papert and a team of researchers at the Massachusetts Institute of Technology Artificial Intelligence Laboratory. Papert saw the computer as a learning device that could create an environment in which children could construct their own knowledge. Logo was designed to be one of the main tools of this construction process. Although it can be used for any programming task, Logo is probably best known for its graphics environment called turtle geometry. In many Logo implementations a small, white triangle (the turtle) appears in the center of the screen. Users can make the turtle move by typing commands as simple as "forward" or "right." Each command must be followed by a number that tells the turtle how far to go in a particular direction. The great virtue of Logo is that it puts the child in command of the computer and makes the programming task much more accessible.

Logo implementations are now available for all the popular home computer brands. They range in price from $175 for Apple Logo to

$55 for Atari's PILOT version for home use. Despite the rather high cost, Apple Logo has been steadily climbing the Apple best-seller charts, ranking sixth in Softalk's April listing. While these charts reflect retail sales, they may include a good bit of educational buying, since schools too purchase significant amounts of software from computer stores. The inclusion of a $175 educational product on a retail best-seller list is worth noting.

Facemaker

Facemaker is another of the early Spinnaker products which has also been on the charts for most of its 20-month history. The end of April saw its 75th appearance among the educational best-sellers on Softsel's list and the program has probably sold in excess of 60,000 copies. Priced at $34.95, the program runs on the Apple, Atari, Commodore, IBM PC and PCjr. The program is designated as appropriate for ages 4-8.

Facemaker allows the user to design and animate a face. To design a face, the user chooses from a series of menus of mouths, eyes, ears, noses and types of hair. Since there are eight possible choices for each feature, a wide variety of different faces is possible. As each feature is selected it is added to the face. Once a face is designed, it can be animated. In animating a face, the user creates a list of instructions for the face to follow. Choices include wink, cry, smile, frown, etc. The animation can be accompanied by appropriate sounds as well.

Essentially the user is writing a small program which determines the animation sequence. The program also includes a game sequence in which the order is reversed and the face is animated and the user asked to specify what steps were involved in the animation.

Facemaker is a simple, but well-designed program. The choice menus are handled in such a way that even a young child can learn fairly easily how to make choices, though non-readers will need adult help at first. Documentation is minimal, but clearly explains the major features of the program. The program offers an introduction to programming for very young children, who as they animate their funny faces begin to connect the sequence of instructions with the resulting animation.

Computer SAT

Though a number of programs aimed at preparing students for the Scholastic Aptitude Test had been around for quite some time, Computer SAT from Harcourt, Brace Jovanovich was the first to make the best-seller lists. Computer SAT costs $79.95 and runs on the Apple, Atari, Commodore 64, IBM PC and PCjr and Radio Shack Model III and Model 4.

There are a number of popular SAT programs. Some are clearly aimed at the schools both by price and structure. Among these are programs from Borg-Warner, CBS, Krell, and the National Association of Secondary School Principals. Other programs

provide simpler, focused practice on verbal or math skills, such as the products from Edu-Ware, MicroLab and Program Design International. A new program from Barrons, priced at $89.95 is currently offering Computer SAT some very active competition.

Computer SAT is an expansion of HBJ's popular paperback "How to Prepare for the SAT." The package contains both the 470-page book, a 50-page manual and two diskettes. The extensive documentation has proven to be a large factor in the success of this program. The software offers repetition, instant timing, instant diagnosis, 1000 electronic vocabulary-building flashcards and a series of 540 drill items. The student begins by taking a practice test, which is printed in the workbook. The computer is used for the answers, which are timed and scored. The computer displays correct and incorrect answers and a menu of study options, with study priorities beside each category. The Verbal Item Banks and Math Item Banks provide practice in high-priority study areas. Feedback is immediate and tutorial explanations for incorrect answers are also provided. Used in conjunction with the SAT preparation book and the program manual, Computer SAT should help students improve their test-taking skills.

Math Blaster

Math Blaster from Davidson and Associates is from a newcomer to software publishing. Basically a drill and practice math program designed for classroom use, it is also selling briskly into the home market. Math Blaster costs $49.95 and runs on the Apple,

Commodore 64, and IBM PC and PCjr. It is intended for use by children in grades 1 through 6.

The program contains tutorial and drill and practice lessons in addition, subtraction, multiplication, division, fractions and decimals. Each math function has five levels of difficulty which may be selected by the child or adult. Over 600 problems are offered for practice. The program also contains a follow-up learning game featuring arcade-style play for reward and motivation. There is an editor feature which allows an adult to enter additional problems for all the activity programs. The manual is meant for classroom use, but is easy to follow and the program should be easy to use for even the youngest children.

Early Games for Young Children

Early Games from Counterpoint Software is one of the relative newcomers to the various lists of best-selling software. The program started out as a strong Apple-format seller and has since expanded its audience. It has been joined by other Counterpoint programs such as Early Games Piece of Cake and Early Games Music. Early Games retails for $29.95 and runs on Apple, Atari, Commodore 64, IBM PC and PCjr, and Radio Shack Model III and Model 4. Early Games for Young Children is appropriate for children ages 3 to 6, according to Counterpoint.

The program consists of nine games: Match Numbers, Match Letters, Count, Add, Subtract, Alphabet, Names, Draw and Compare Shapes.

The activities are selected from a picture menu. The child hits the spacebar when a picture of the game he/she wants to play appears on the screen. Because the programs are aimed at very early learners, they are very simple. For example, in Match Numbers the child is shown a large number on the screen. To play, the child simply keys in the character which matches the display on the screen. This provides practice in form discrimination and may result in some familiarity with the computer keyboard. However, there is no counting involved and the child will need adult help to connect the symbol matched with its name and its numerical value.

However, with active parental involvement the programs offer the raw material and colorful graphics with which to stimulate ongoing curiosity. The most interesting game is Draw. In this activity the child can place graphic shapes on the screen just by pressing single keys on the keyboard. Some keys draw horizontal lines, other vertical and diagonal. Colors are changed by hitting the spacebar.

Algebra Series

The Algebra Series from Edu-Ware is one of the few best-selling software programs designed for use with older students. The series consists of six separate modules, though Algebra I is probably the best-selling individual title. Each program sells for $39.95 and runs on the Apple. Algerba I is also available for the IBM PC.

The whole series covers all the topics included in a first-year algebra course. Algebra I develops five major content areas: definitions, number line operations, sets, evaluating expressions, and rules for equation reduction. Each of the five major units are broken into three to five concepts. Within each concept the student has the option of choosing to work with definitions, rules, examples or sample problems. Post-tests are available at the end of each unit. The learner's progress, the concepts learned and those that were troublesome are compiled at the end of each unit. The mode of presentation is very straightforward, but each concept is covered in some depth. The program is clear and easy to use.

This product is very different from everything examined thus far. It is straight computer-aided instruction, with appropriate graphics, but no arcade games or exploratory learning approaches. It is suitable for both supplementary and stand-alone learning. Since it is one of the few widely available commercial packages aimed at the high school age group, it sells in small but steady numbers. The parents who buy this program for their children are either hoping to give them a little competitive edge or are seeking a tutorial product to help a child experiencing difficulty.

Rocky's Boots

Rocky's Boots is probably one of the best known of the products

from The Learning Company. The program runs only on the Apple and therefore its sales do not approach those of programs formatted for five or six of the popular home computers. However, the program has received much critical acclaim and widespread press attention and is representative of a type of software that is expected to become more and more common. Rocky's Boots sells for $49.95 and is designated for ages 9 and up.

Rocky's Boots is an electronic construction set. In the program, Rocky, a boot-wearing raccoon, teaches children (and adults as well) to build animated logic machines. The program includes a series of tutorials on building these machines and two sets of games. The machines are composed of circuit parts that direct the flow of electricity. They are built by moving the cursor around the screen, picking up parts and hooking them together. The program uses the simulation of building machines to teach the logic of what makes computers work and how to form logical solutions. The three tutorial sections do a good job of introducing the user to the program directions and the concepts and tools of the logic world. After learning the way around the tutorials, the user is ready to try and solve the series of game puzzles in the fourth program. The games range from fairly simple exercises (simple, that is, for those who have mastered the concepts taught earlier) to progressively more challenging games with which even The Learning Company's programmers admit they have some trouble.

This is a highly challenging program and will probably be too advanced for some nine and ten year-olds. But the program effectively teaches and reinforces thinking skills from simple to complex, and reviewers, teachers and children alike have been known to really get caught up in the program. The documentation does not offer enough help for parents who may wish to help their children in their early experiences with this game.

Arcademic Skill Builders in Math

Arcademic Skill Builders in Math is a series of six programs from Developmental Learning Materials. Titles in the series include: Alien Addition, Minus Mission, Meteor Multiplication, Demolition Division, Alligator Mix and Dragon Mix. Each of the individual titles sells quite well and sales for the whole series place it among the coming best-sellers. Each package sells for $29.95 and runs on the Apple and IBM PC and PCjr. The material is appropriate for grades 2-8 as skill reinforcement and remediation.

The format for each of the individual programs is similar. Each employs an arcade-type game format, the object of which is to destroy an arithmetic problem by typing in the correct answer before players themselves are destroyed. While themes and graphics change, all the programs operate according to the same set of rules. Players have to solve simple problems formed from numbers in one of three operational skill levels (with number ranges 0-3, 0-6, or 0-9). Players are able to determine the

speed of the approaching problems and the run time of the game. The instructions for the games are included in the written documentation, but do not appear on screen. With a little experimentation, they are not too difficult to figure out.

The games do not teach mathematical concepts. They only offer motivating drill and practice. They place a high value on quick, accurate recall of the math facts involved, since incorrect answers result in the players destruction. Once the game formats are figured out, little adult help is required, though DLM does include suggestions to parents about how to make use of the programs.

These then are my list of best-sellers in the home educational software arena. There are certainly other programs that deserve to be mentioned, especially Stickybear ABC from Xerox, Gertrude's Puzzles from the Learning Company and Math Action Games from Scott, Foresman. In addition, several more Spinnaker titles (Kindercomp, In Search of the Most Amazing Thing and Alphabet Zoo) could have been included. In sheer numbers these Spinnaker titles have outsold some of the programs included among the best-sellers. But the list of top products was selected with an eye to balance. Though it includes the all-time best-sellers, it also includes several of the newer programs showing real strength on the charts as well as programs with limited sales because of audience or machine format, but that are well on the way to becoming "old standards."

WHY Educational Home Computing?

In conclusion, I would like to speculate a bit on why it is that educational home computing is generating so much interest. Retailers report that educational software sales accounted for 10 to 30% of software sales this spring, having grown from an average 2 to 10% of sales a year ago. Parents who not too long ago had to diligently search for a store carrying a variety of educational titles are now finding whole sections of computer and software stores devoted to educational software. Some stores even have staff members who are knowledgeable about educational products.

What's caused all this? We know that some 2.7 million families with children purchased home computers this past year. Since households with children present were twice as likely to own computers as those without children, it seems fair to assume that children were at least a factor in the decision process. It's not too hard to imagine at least some of the reasons. American concern about the state of public education is at a high, fueled by the critical reports of a number of prestigious bodies. Concern is especially high about the preparation our students are receiving to live and work in a high-tech world. These concerns, aided by a little old-fashioned parental guilt, certainly offer part of the explanation for the current interest in home computers as educational tools. What better way to prepare for a high-tech future than with the current high-tech tool?

The computer offers a solution to a parental problem. Whether worried about giving the child a competitive advantage or concerned about making up for possible deficiencies in schooling, the computer is an appropriate tool. And a tool that children are drawn to, rather than one they have to be coaxed to use. Further, the computer is a tool that the whole family can use. Interest in word processing, using the computer to help with financial affairs, paying bills, and ordering goods electronically, and playing family games are all fairly high on the part of potential computer buyers. In this light, the computer offers more to the family than does the newest 8MM movie camera.

But a computer is just a tool. Computers can open new ways of developing thinking and problem-solving skills and they provide new possibilities for learning through active exploration. But in most cases, computers are only as good and as useful as the software they run. It is interesting to note that few of the programs included among the best-sellers are subject specific. Parents seem to be instinctively shying away from subject-related programs that define right vs. wrong answers and that confine choice to a set of multiple-choice items. Though several of these programs sell well, they do not dominate the list. Instead parents seem to be selecting programs that attempt (some better than others) to develop problem-solving and thinking skills. It is these skills that parents seem to be seeking when they choose to buy programs like Rocky's Boots, programs which create and define limits to an electronic world and help structure learning

within that world such that children infer both mathematical and qualitative relationships. We can only hope that such enlightened software buying continues.